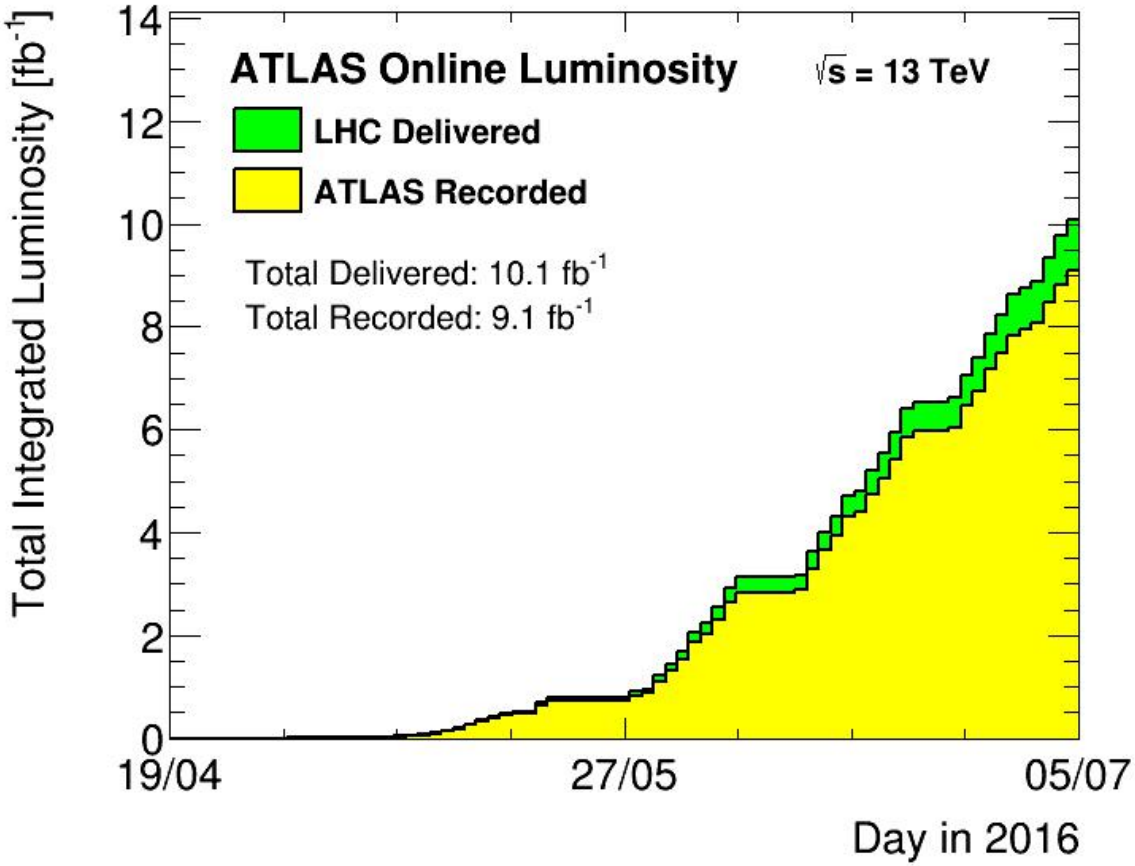
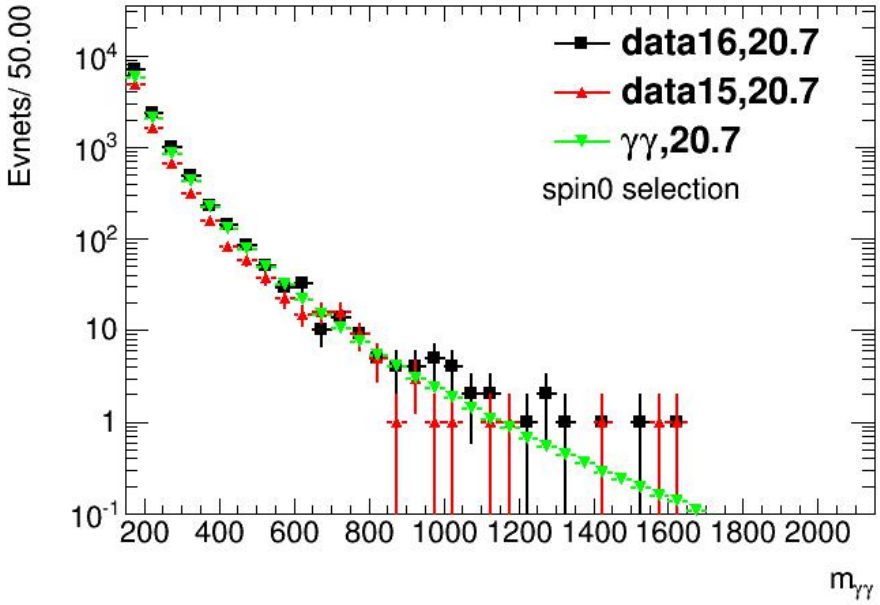
weekly report

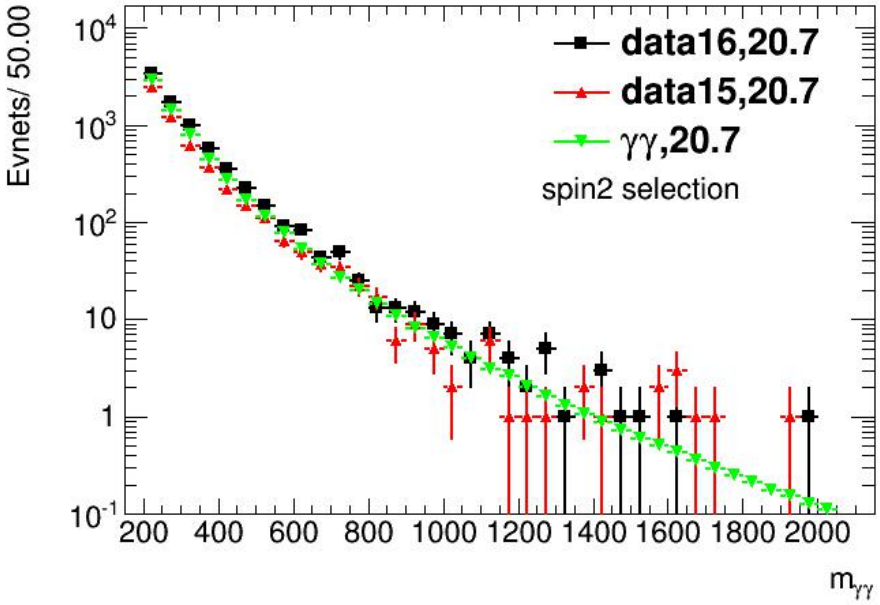


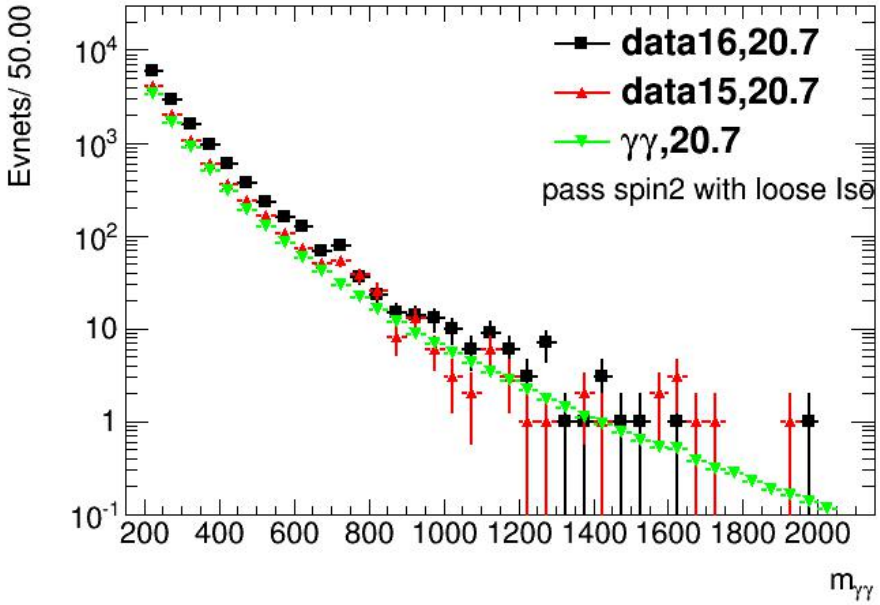
outline

- in GRL 5194/pb, finished jobs about ~5/fb
- 750
  - event display :
  - https://espace.cern.ch/atlas-phys-higgs-htogamgamRun2/Lists/lowhighmass/DispForm.aspx?ID=186&ContentTypeId=0x0100F0A3C48DE287AA44A9422C00D53927A0
- 125 VBF (mjj)
- purity for HGam Coupling

750

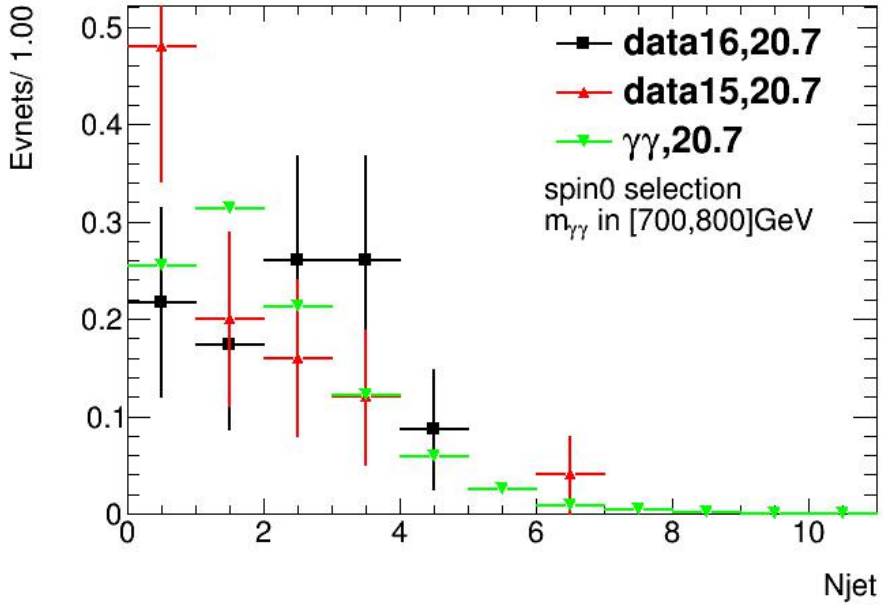


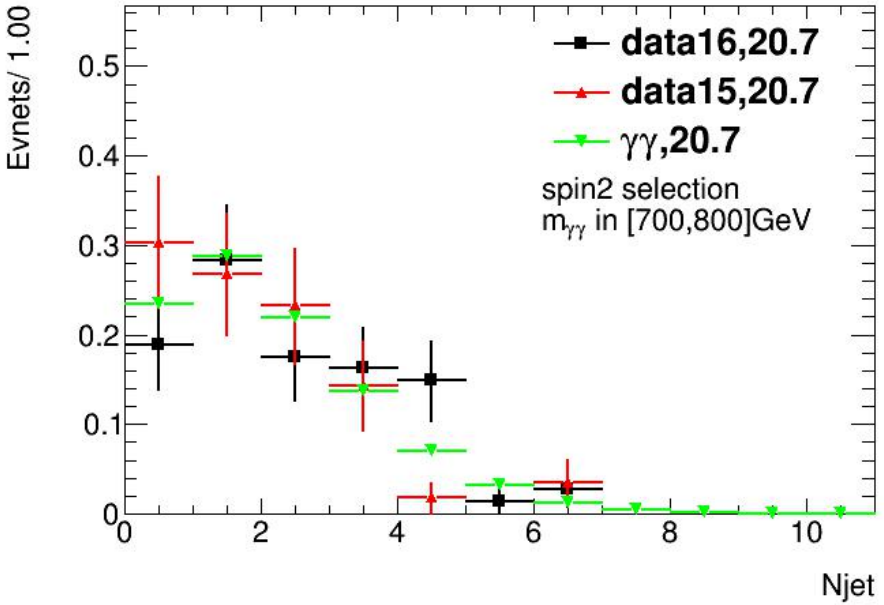


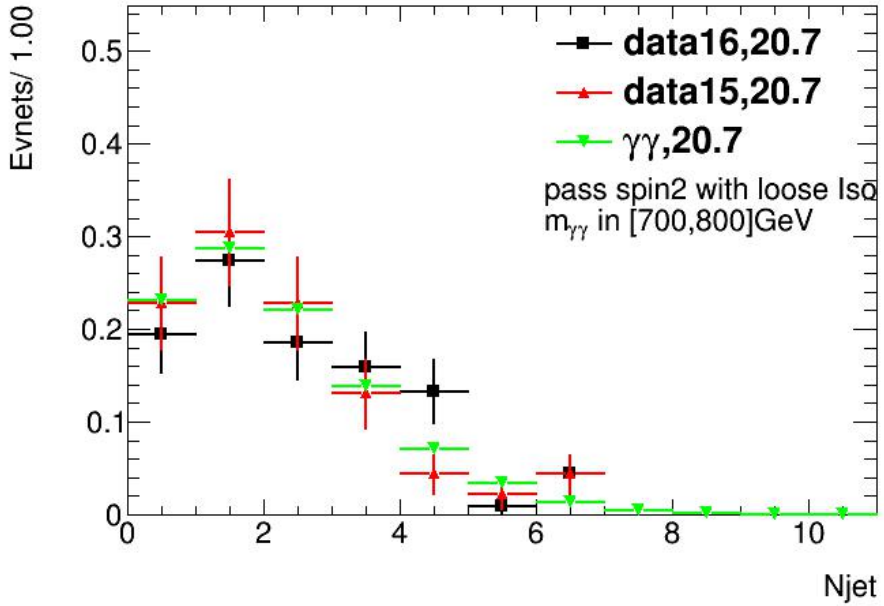


[700,800]	higgs	exotic	exoticL
2015	25	56	92
2016	23	74	113
2016/2015	0.92		

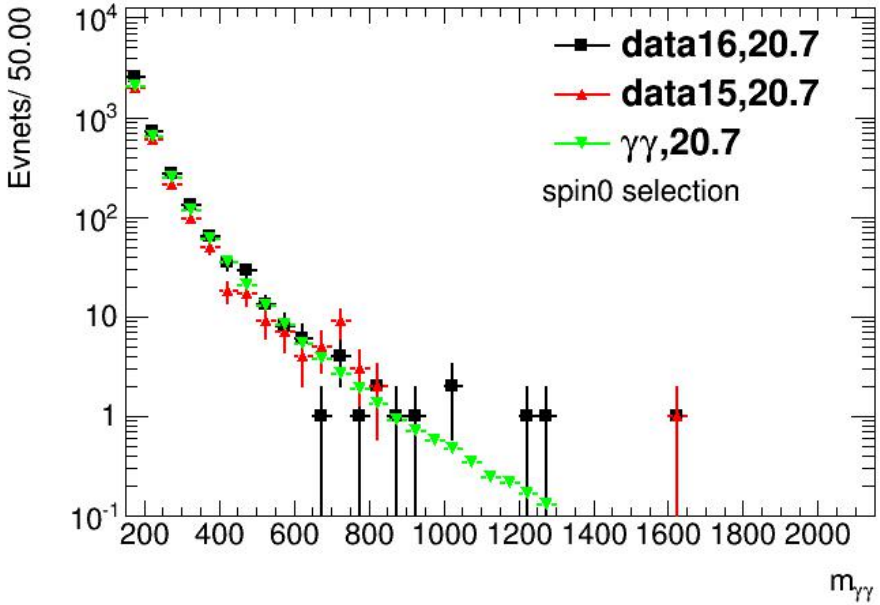
Njet

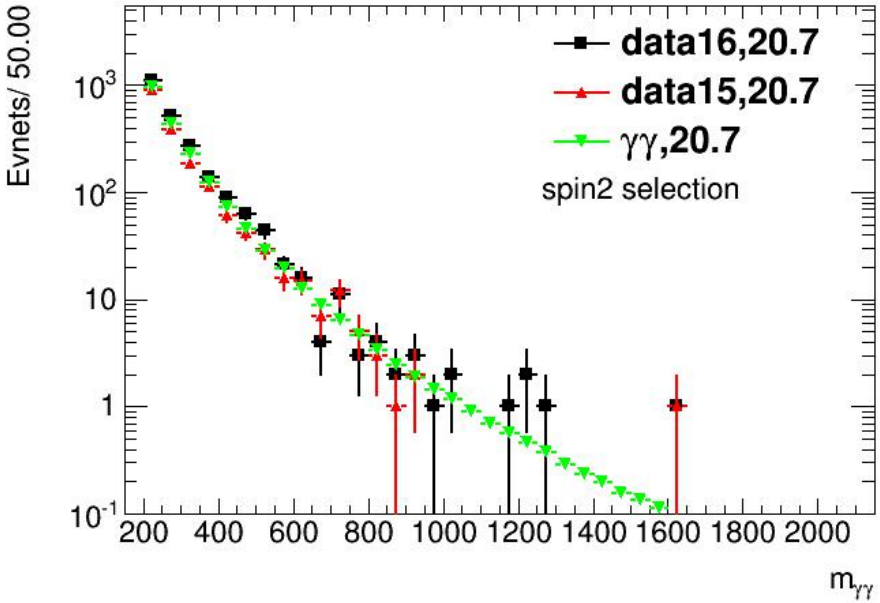

Evnets/ 1.00
data16,20.7
data15,20.7
γγ,20.7
spin0 selection
m$_{γγ}$ in [700,800]GeV
Njet

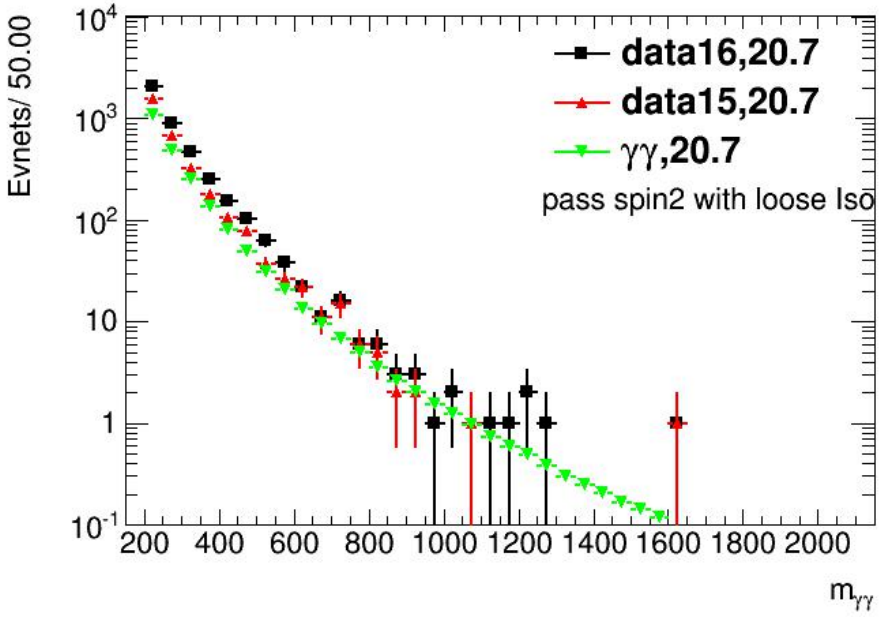

Evnets/ 1.00
data16,20.7
data15,20.7
γγ,20.7
spin2 selection
m$_{γγ}$ in [700,800]GeV
Njet


Evnets/ 1.00
data16,20.7
data15,20.7
γγ,20.7
pass spin2 with loose Isō
m$_{γγ}$ in [700,800]GeV
Njet

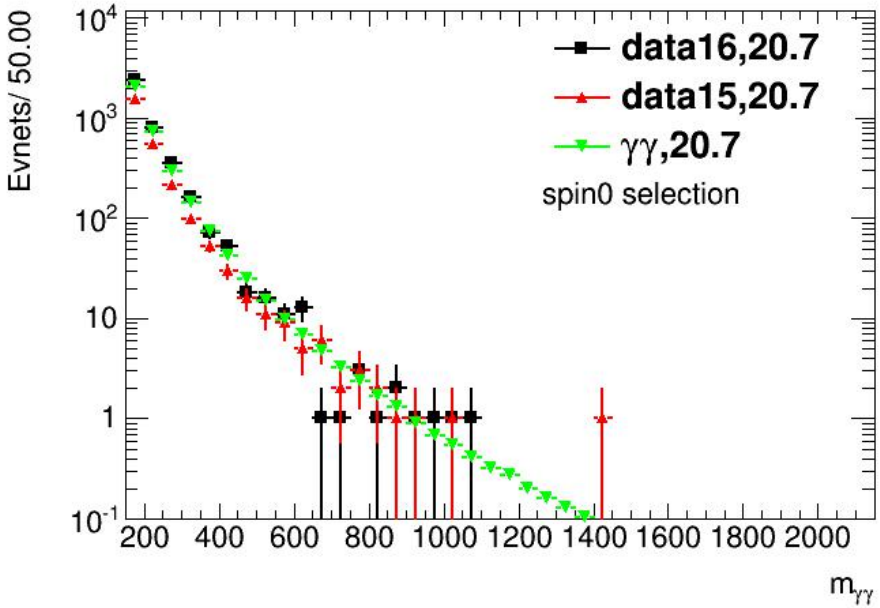
0jet

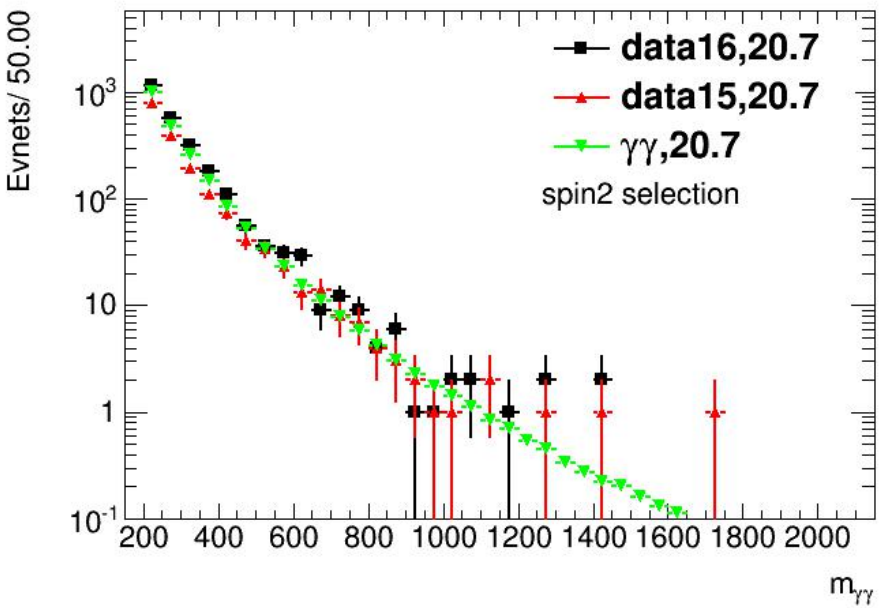

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin0 selection
$m_{\gamma\gamma}$

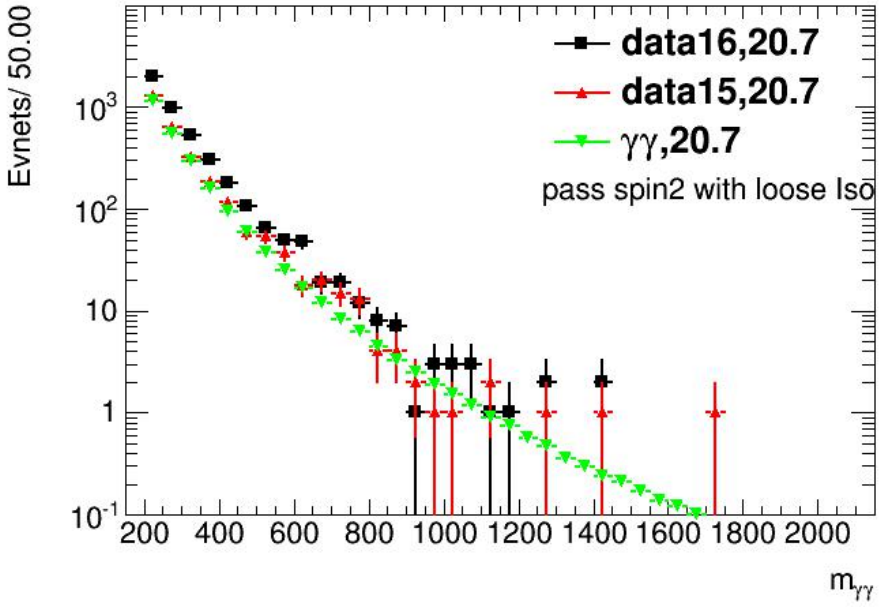

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin2 selection
$m_{\gamma\gamma}$


Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
pass spin2 with loose Iso
$m_{\gamma\gamma}$

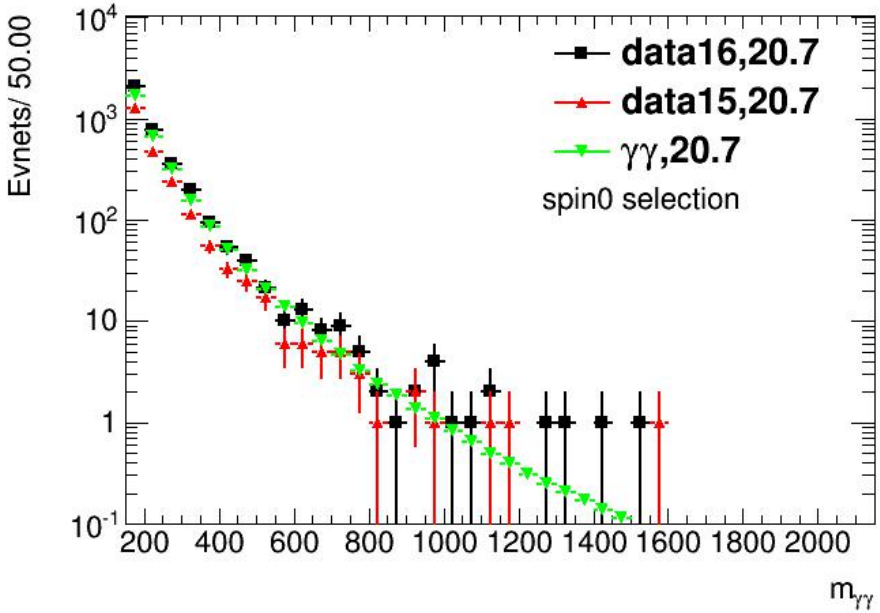
1jet

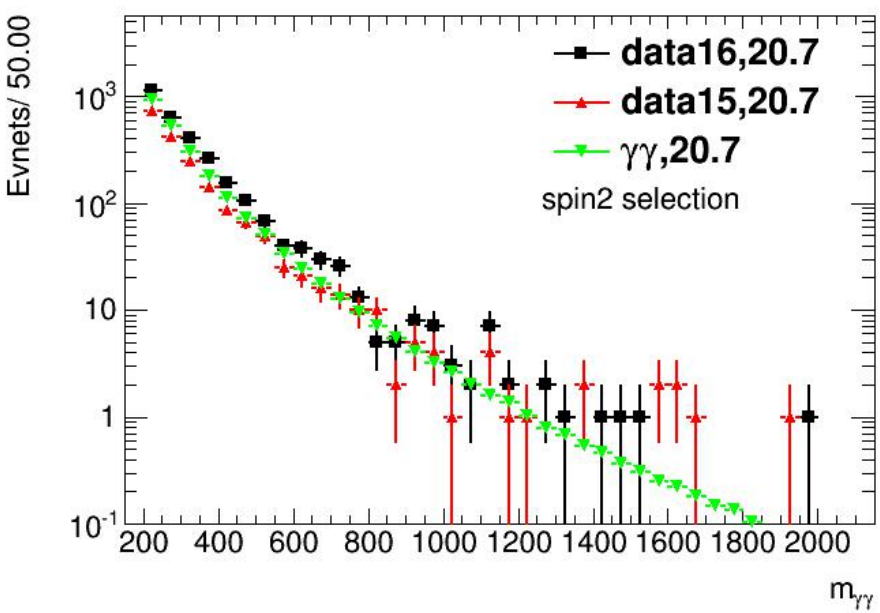

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin0 selection
$m_{\gamma\gamma}$

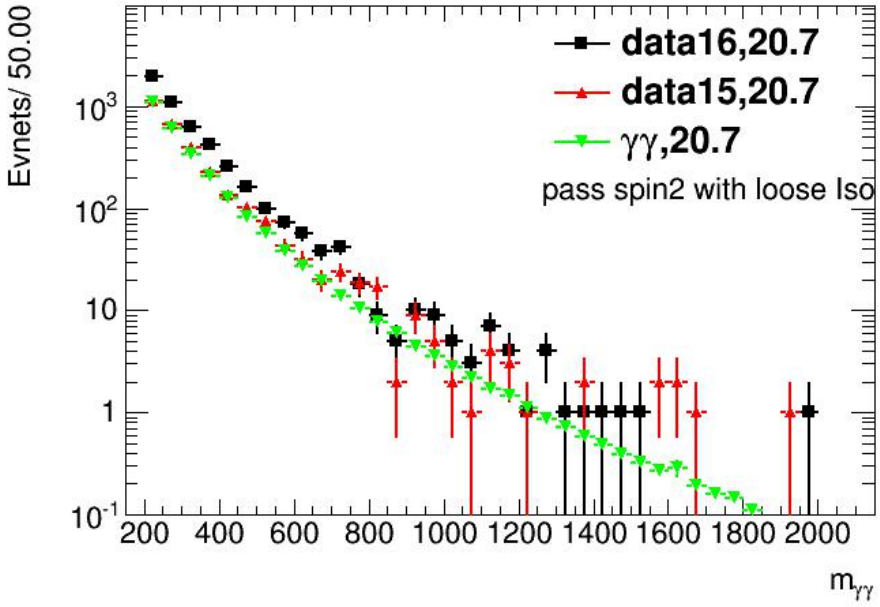

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin2 selection
$m_{\gamma\gamma}$


Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
pass spin2 with loose Iso
$m_{\gamma\gamma}$

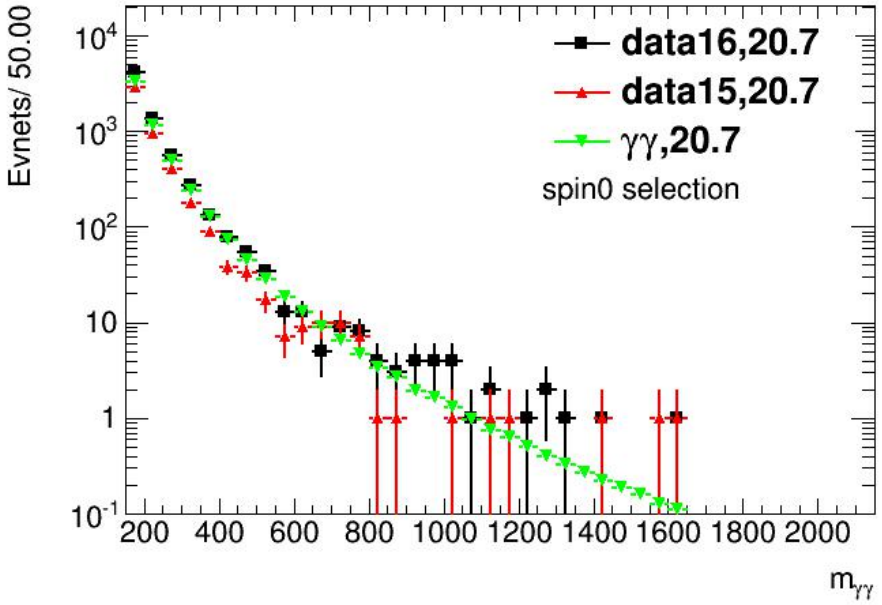
>=2jet

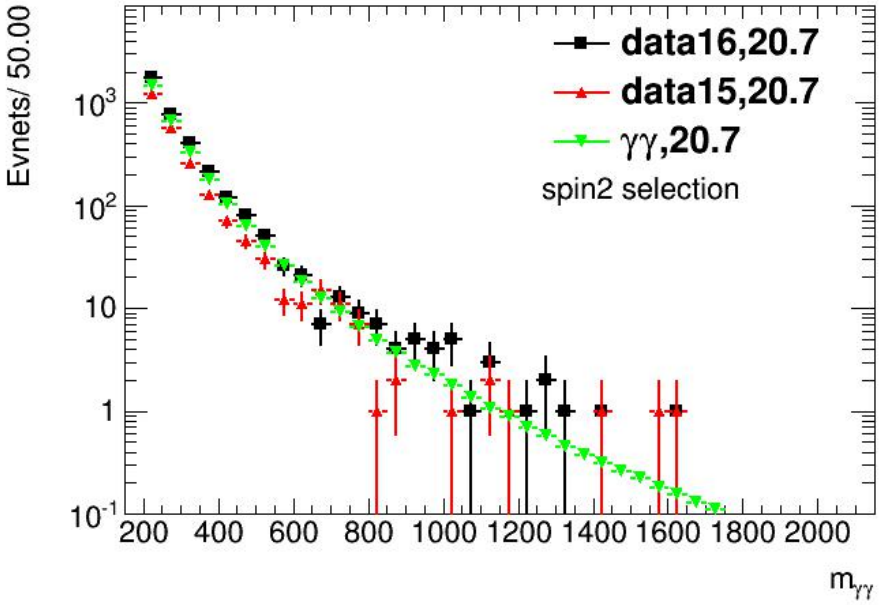

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin0 selection
$m_{\gamma\gamma}$

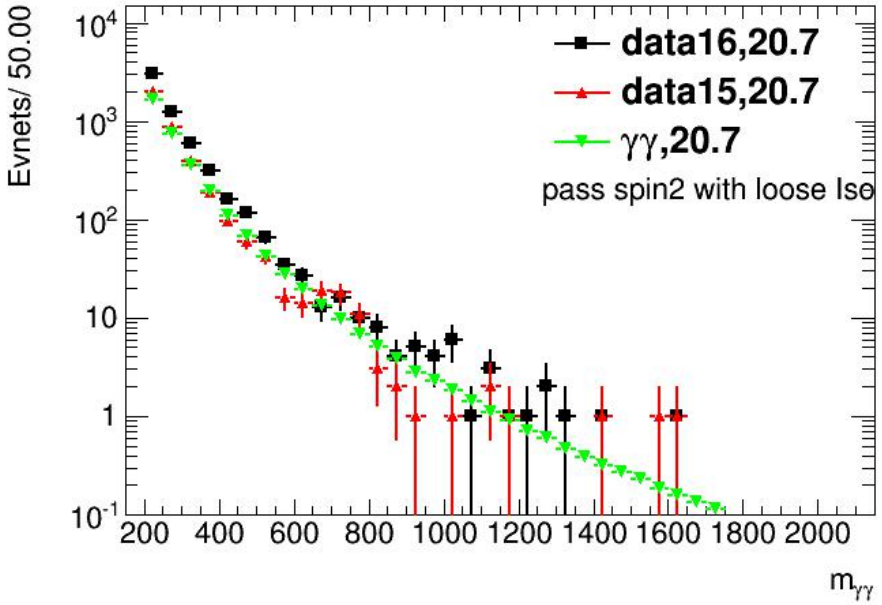

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin2 selection
$m_{\gamma\gamma}$


Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
pass spin2 with loose Iso
$m_{\gamma\gamma}$

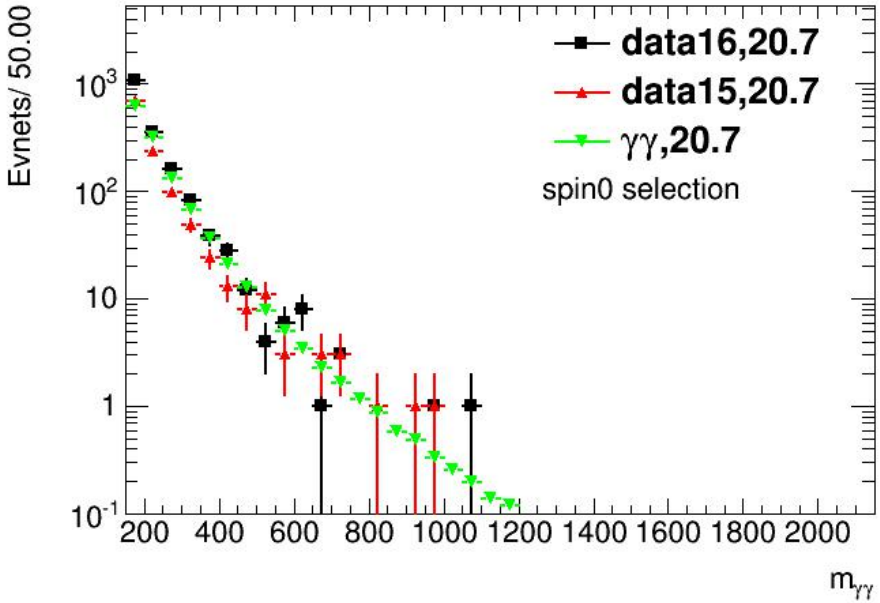
BB

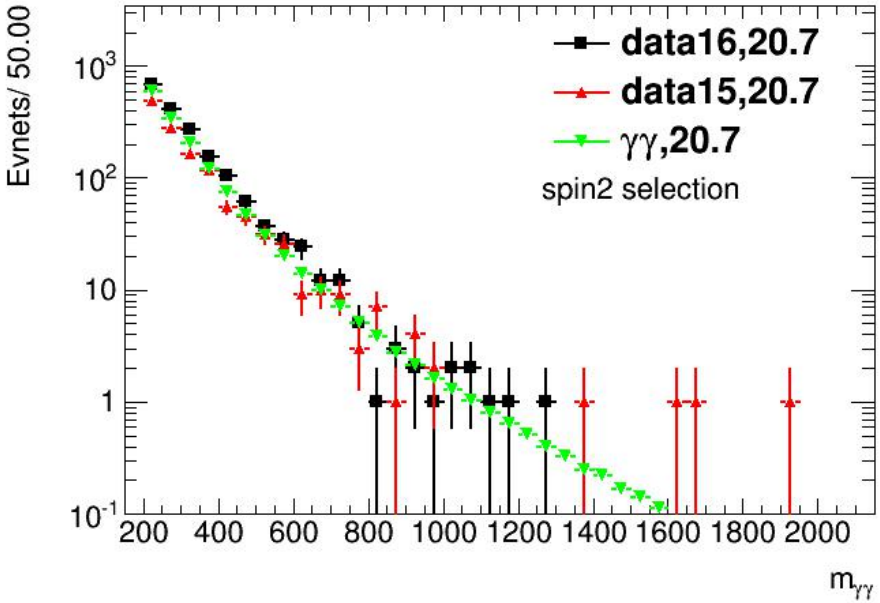

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin0 selection
$m_{\gamma\gamma}$

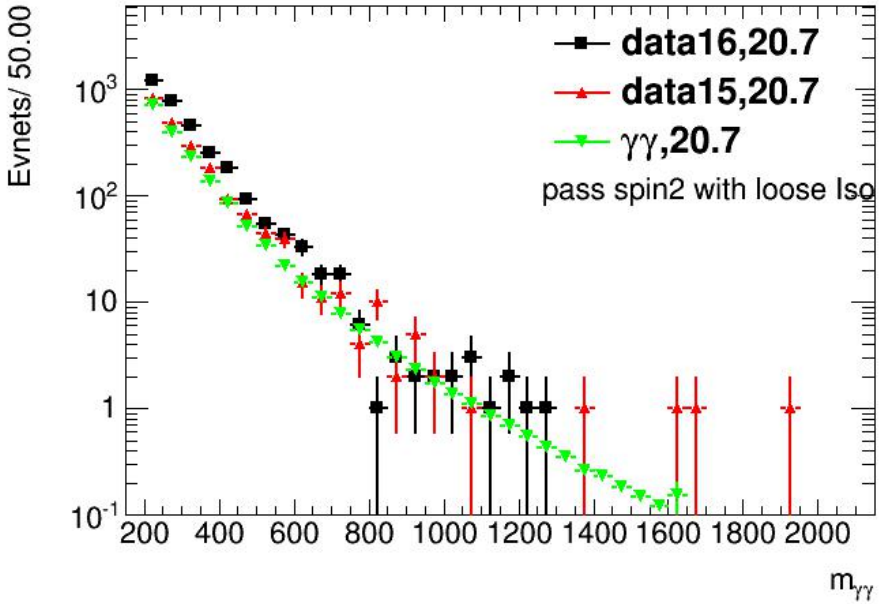

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin2 selection
$m_{\gamma\gamma}$


Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
pass spin2 with loose Ise
$m_{\gamma\gamma}$

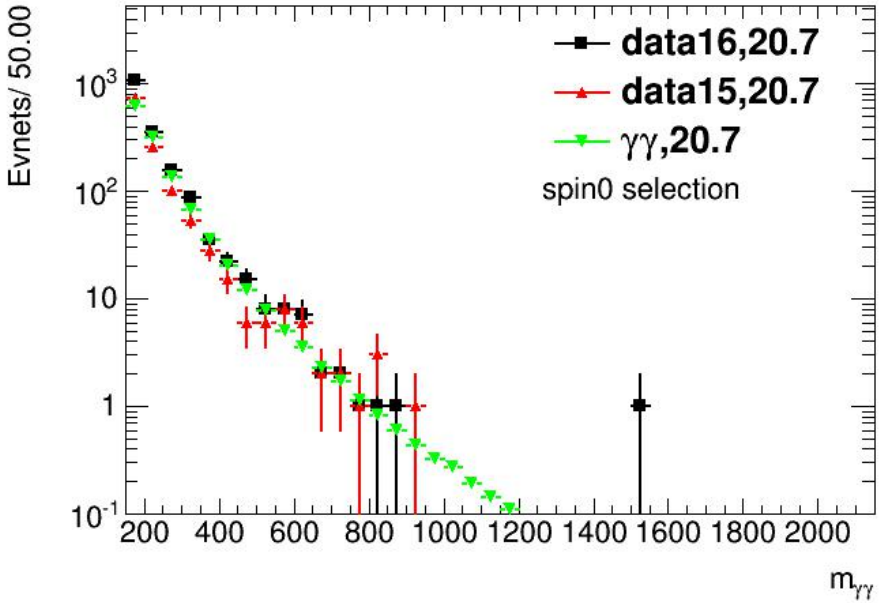
BE

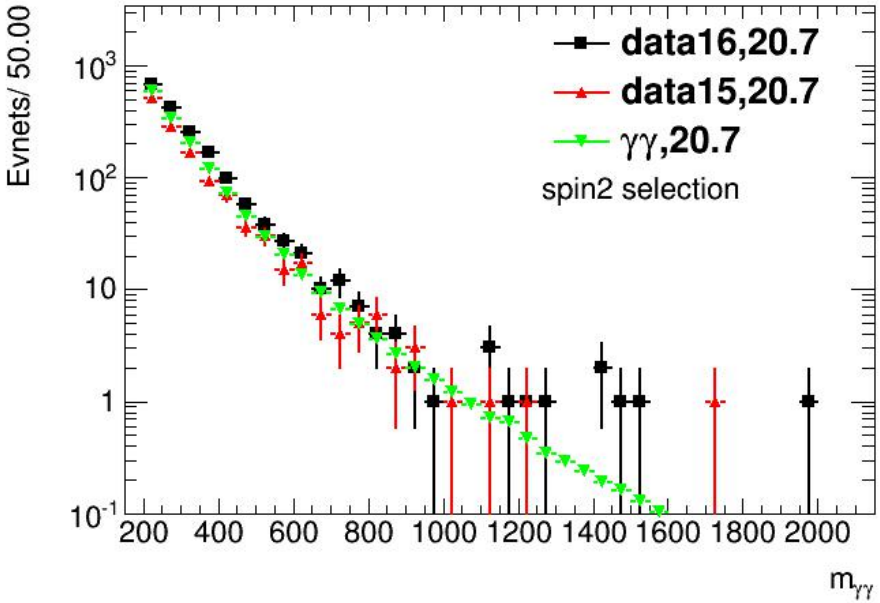

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin0 selection
$m_{\gamma\gamma}$

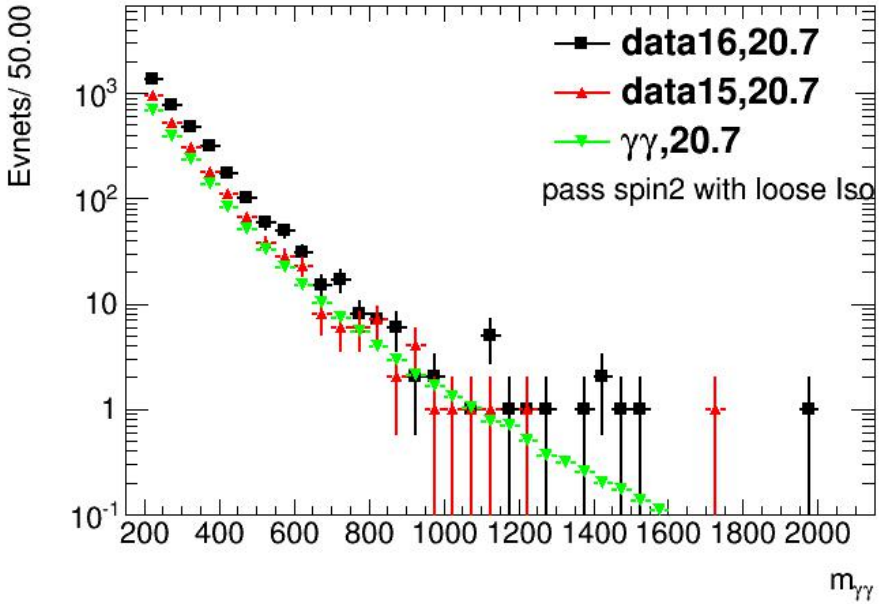

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin2 selection
$m_{\gamma\gamma}$


Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
pass spin2 with loose Iso
$m_{\gamma\gamma}$

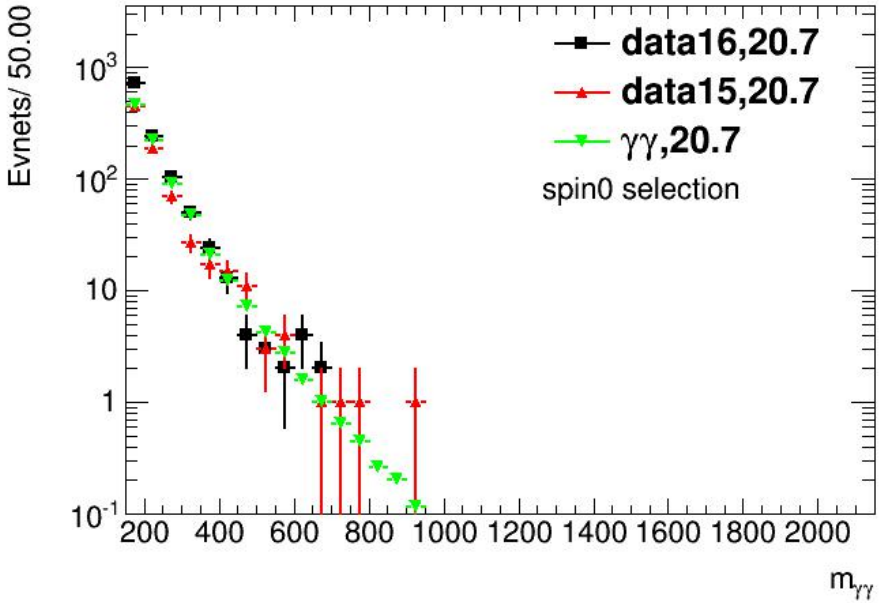
EB

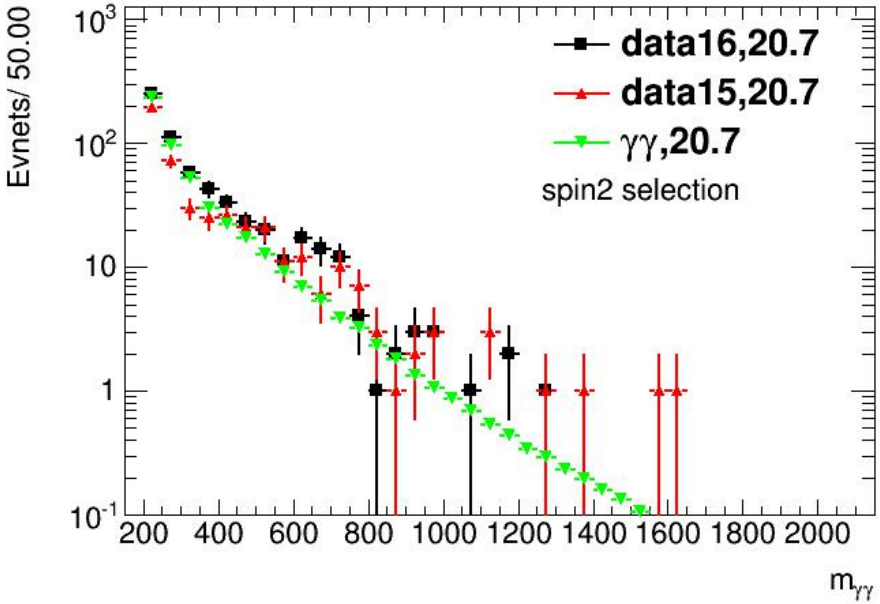

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin0 selection
$m_{\gamma\gamma}$

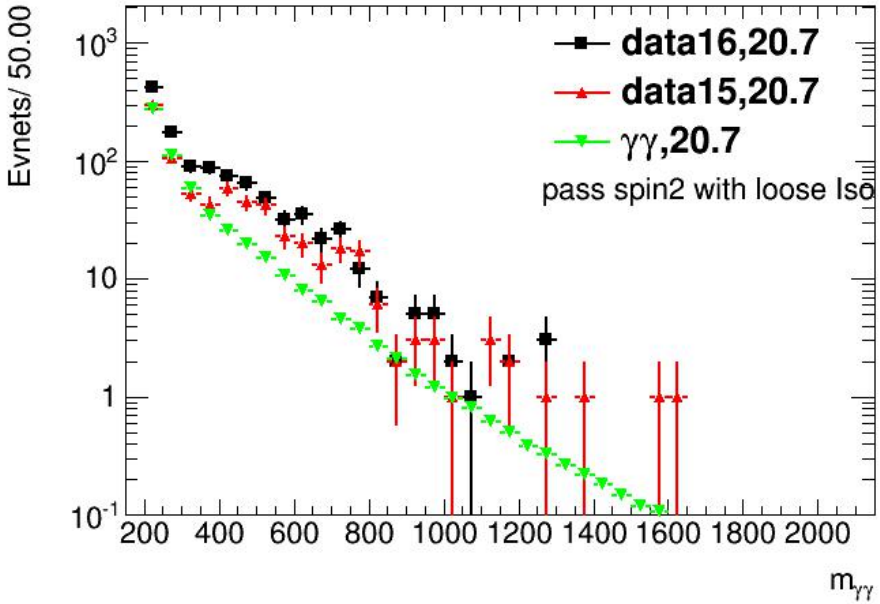

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin2 selection
$m_{\gamma\gamma}$


Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
pass spin2 with loose Iso
$m_{\gamma\gamma}$

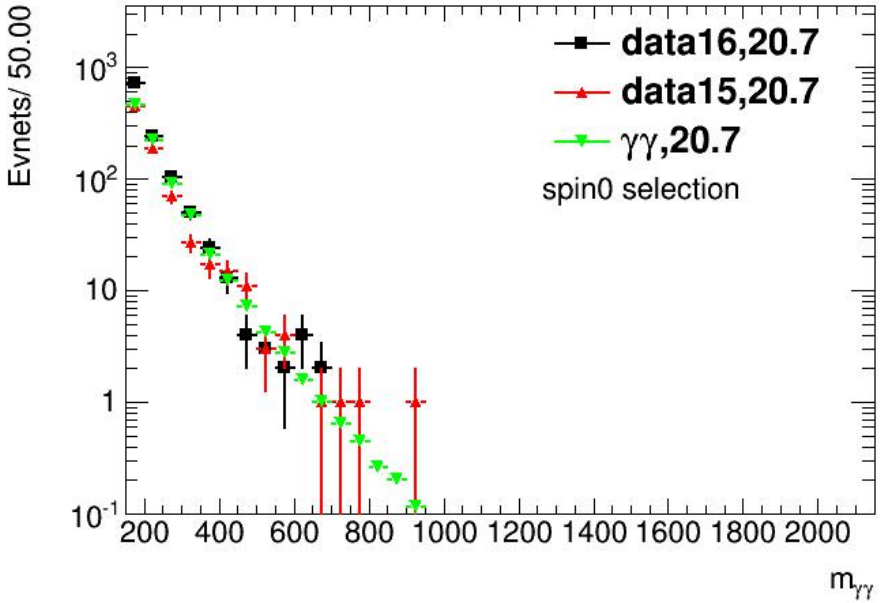
EE

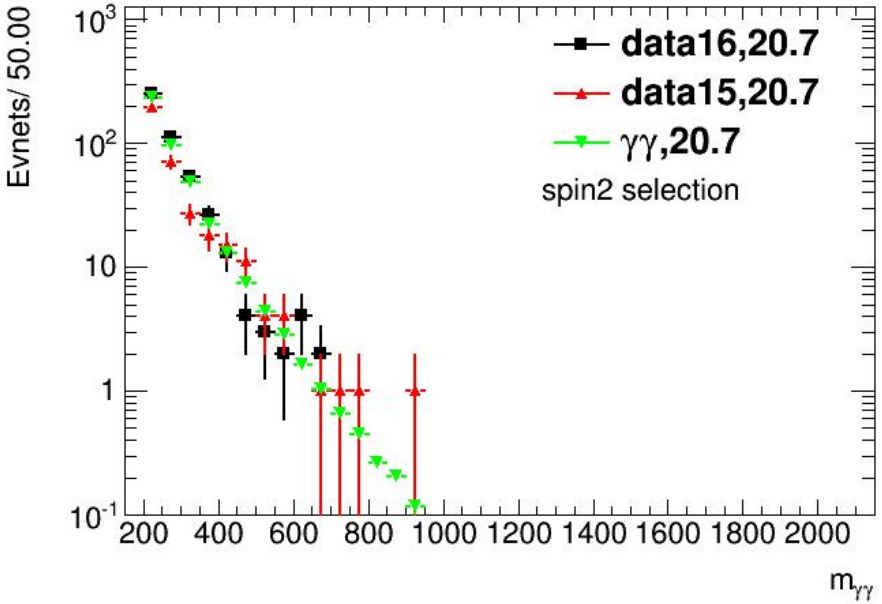

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin0 selection
$m_{\gamma\gamma}$

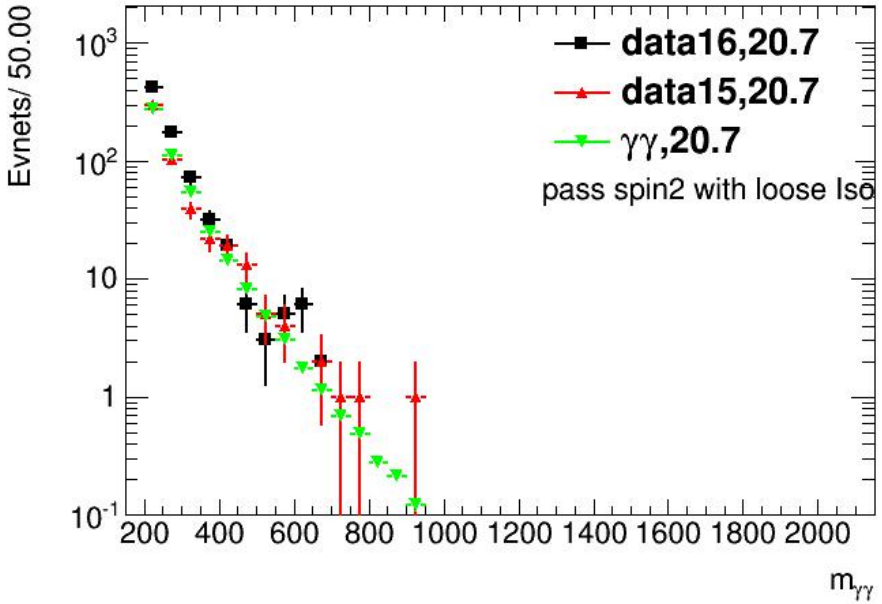

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin2 selection
$m_{\gamma\gamma}$


Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
pass spin2 with loose Iso
$m_{\gamma\gamma}$

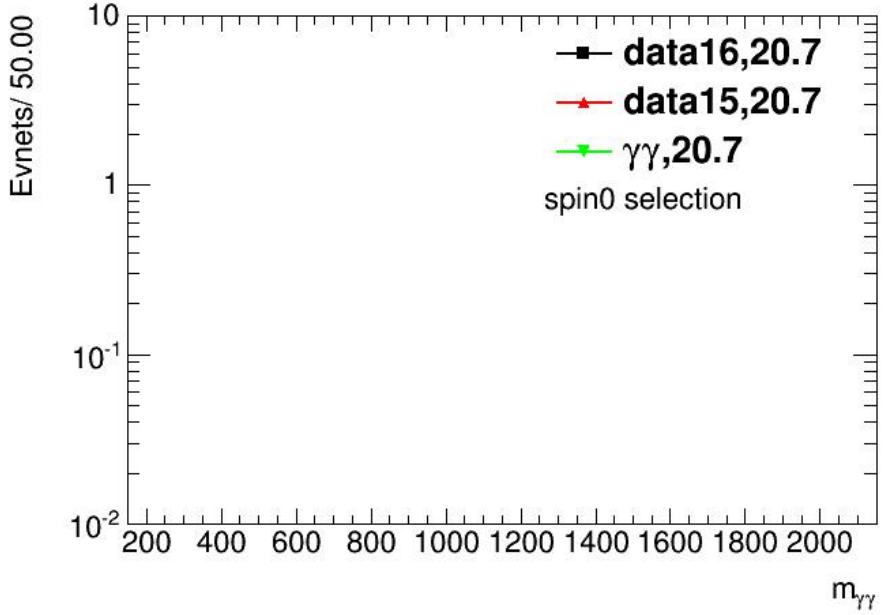
EEss

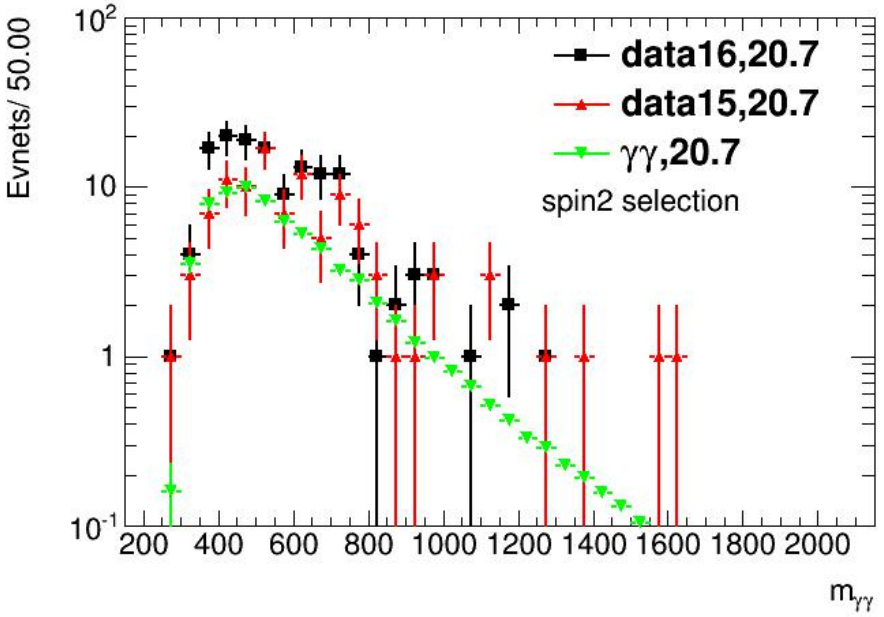

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin0 selection
$m_{\gamma\gamma}$

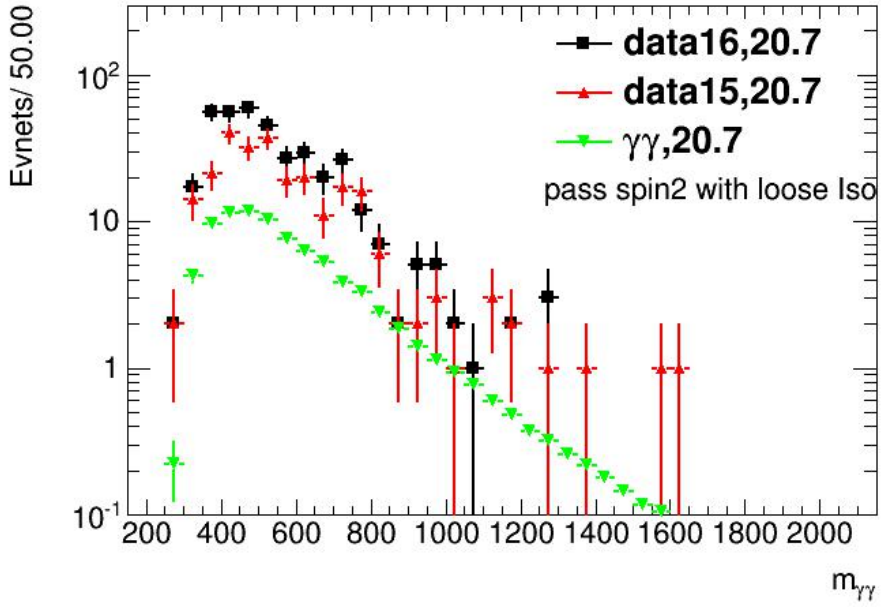

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin2 selection
$m_{\gamma\gamma}$


Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
pass spin2 with loose Iso
$m_{\gamma\gamma}$

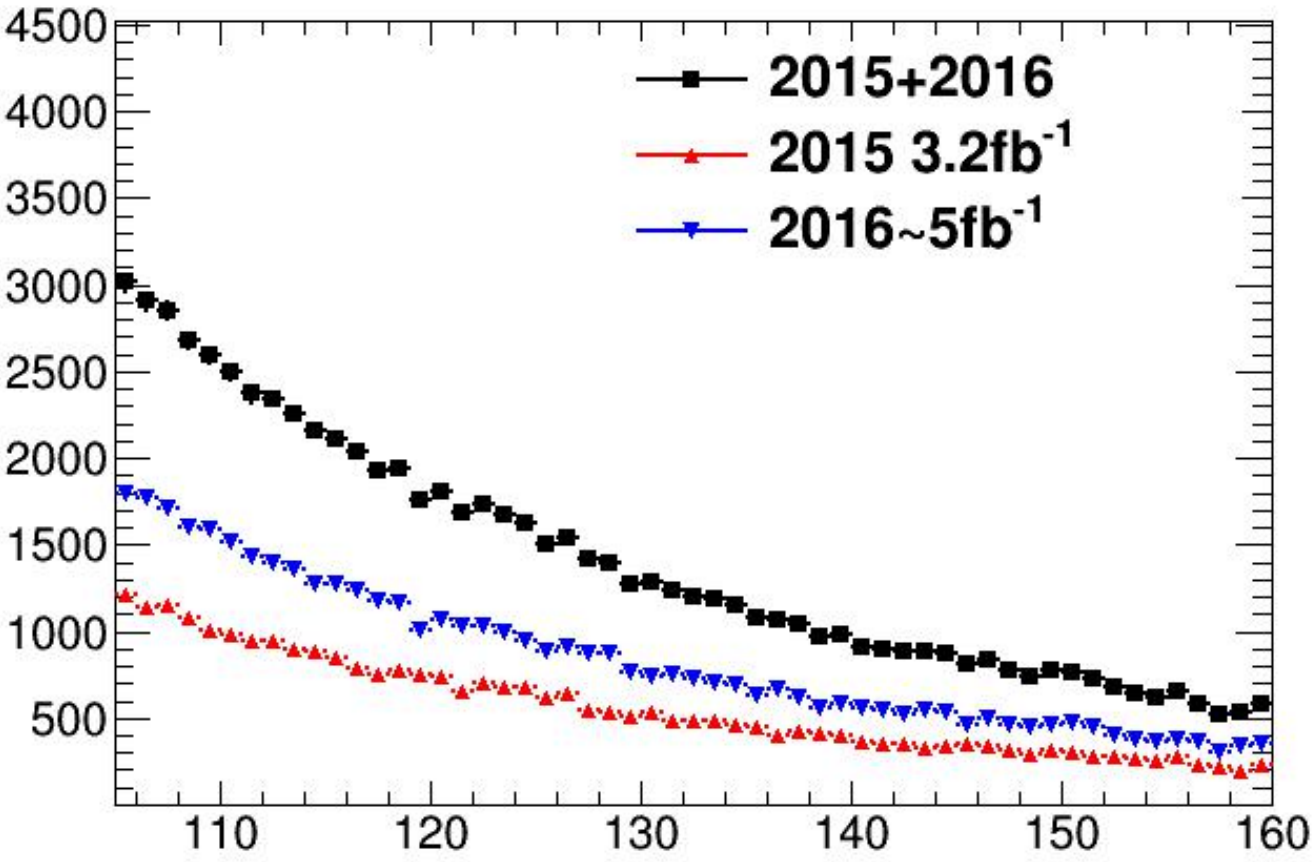
EEos


Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin0 selection
$m_{\gamma\gamma}$


Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
spin2 selection
$m_{\gamma\gamma}$

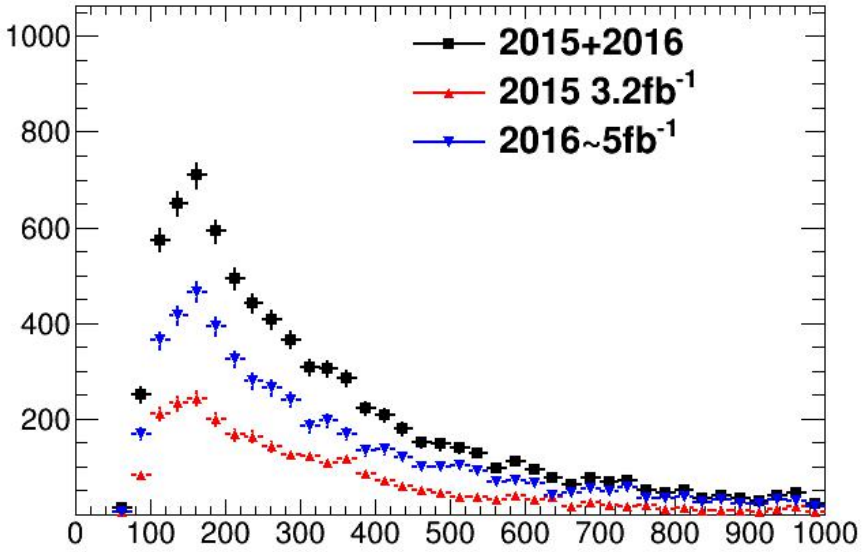

Evnets/ 50.00
data16,20.7
data15,20.7
γγ,20.7
pass spin2 with loose Iso
$m_{\gamma\gamma}$

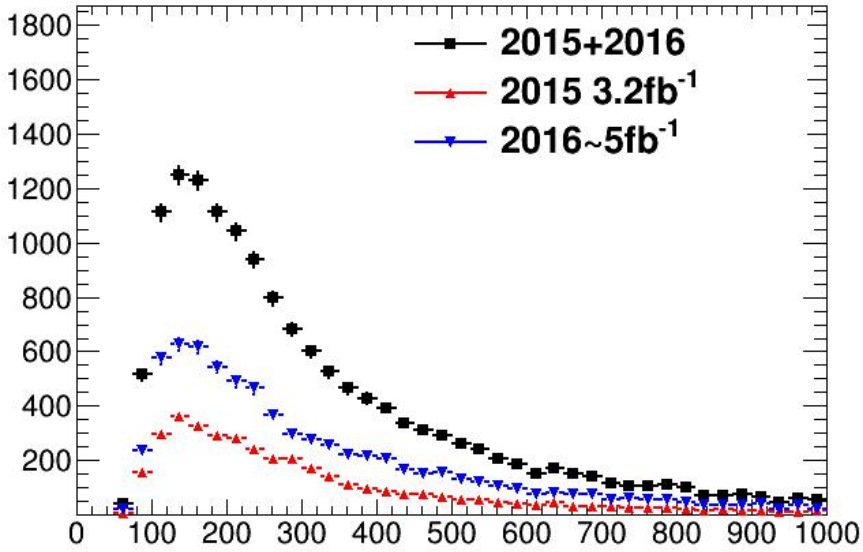
SM Higgs


4500
4000
3500
3000
2500
2000
1500
1000
500
110
120
130
140
150
160
2015+2016
2015 3.2fb-1
2016~5fb-1

mjj

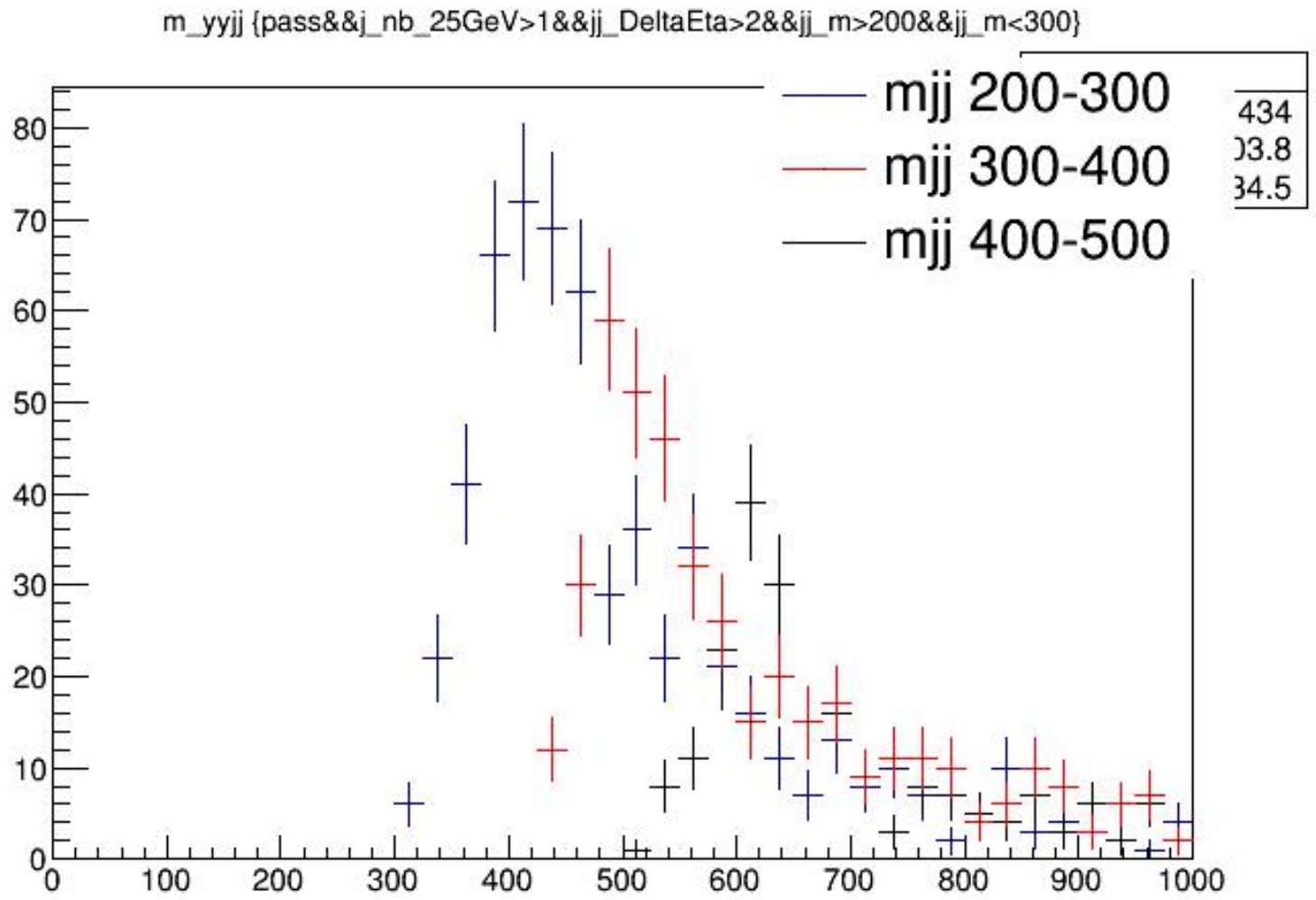
- mjj : SM H->yy selection + N_j>1, jj_DeltaEta>2
- left : nominal selection, right : reverse Isolation





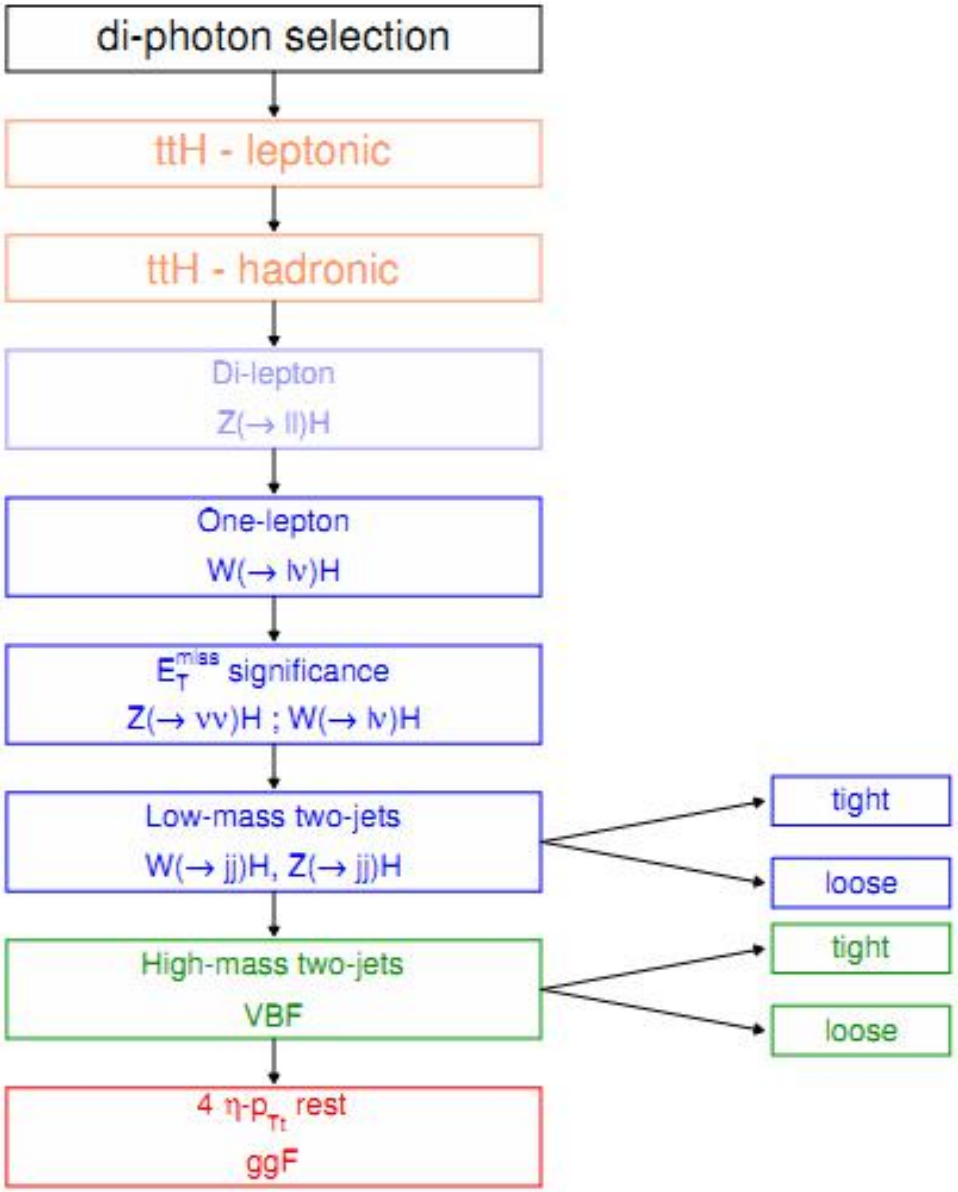
myyjj

- no resonance
- data 2015



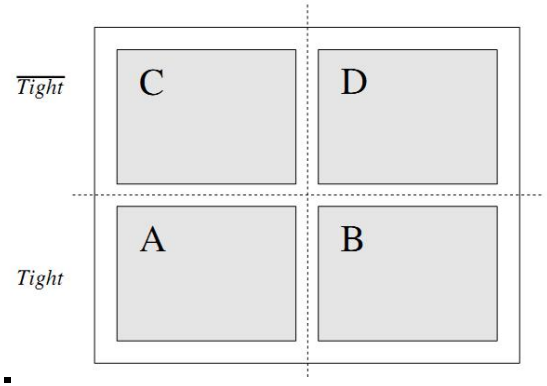
Purity measurement

- Sample
  - data15 : h012 3245ipb
  - data16 : h012 3568ipb
  - sherpa : h012 100-160
- Categorization
  - 13 categories
  - no event in VHdilep
  - 3 event in VHlep
- used to spurious signal
  - request from Huijun...



method description

- 2x2 sideband
  - both leading/subleading photon can be splitted into 4 regions
  - totally we have 16 regions AA,AB.....
- Parameters
- tight efficiency
- Iso efficiency
- tight fake rate
- Iso fake rate
- yield of yy,yj,jy,jj



$$
\begin{aligned}
N_{\mathrm{TITI}} = & W_{\gamma\gamma}^{\mathrm{L'L'}} \epsilon_{I1}\epsilon_{T1}\epsilon_{I2}\epsilon_{T2} \\
& + W_{\gamma\mathrm{j}}^{\mathrm{L'L'}} \epsilon_{I1}\epsilon_{T1} f_{I2} f_{T2} \\
& + W_{\mathrm{j}\gamma}^{\mathrm{L'L'}} f_{I1} f_{T1} \epsilon_{I2}\epsilon_{T2} \\
& + W_{\mathrm{jj}}^{\mathrm{L'L'}} f'_{I1} f'_{T1} f'_{I2} f'_{T2} \xi_{Ijj} \,,
\end{aligned}
\tag{2}
$$

where

- ϵ_{I1} and ϵ_{I2} are the efficiencies of the isolation criteria of one of the six analysis under study for the leading and subleading photons respectively. They are determined from the di-photon simulation;
- ϵ_{T1} and ϵ_{T2} are the Tight identification efficiencies for the leading and subleading photons respectively, also determined from the di-photon simulation;
- f_{I1} and f_{I2} are the isolation fake rates for the γj and jγ events, fitted directly on data;
- f_{T1} and f_{T2} are the Tight identification fake rates for the γj and jγ events, fitted directly on data;
- f'_{I1} and f'_{I2} are the isolation fake rates for the jj events, fitted directly on data;
- f'_{T1} and f'_{T2} are the Tight identification fake rates for the jj events, fitted directly on data;
- ξ_{Ijj} is the isolation correlation factor between the jets in the jj events, fitted directly on data.

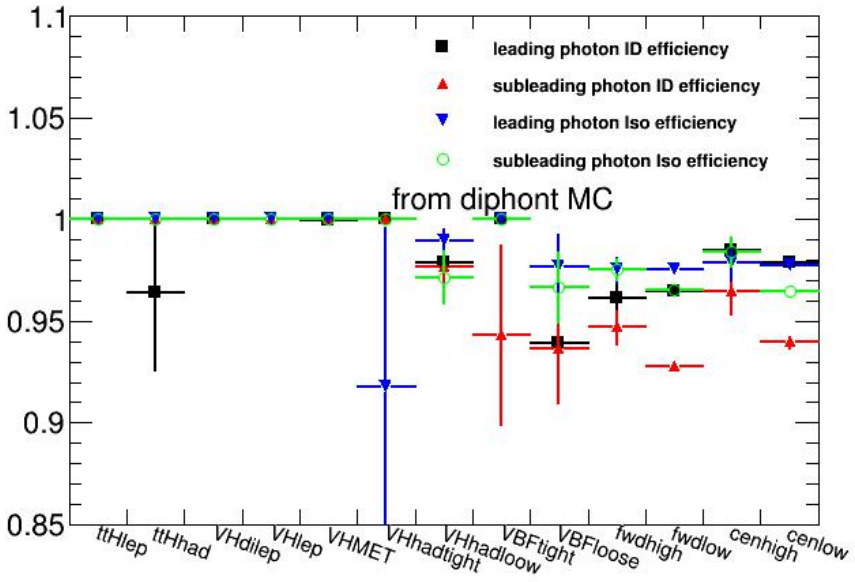
method description

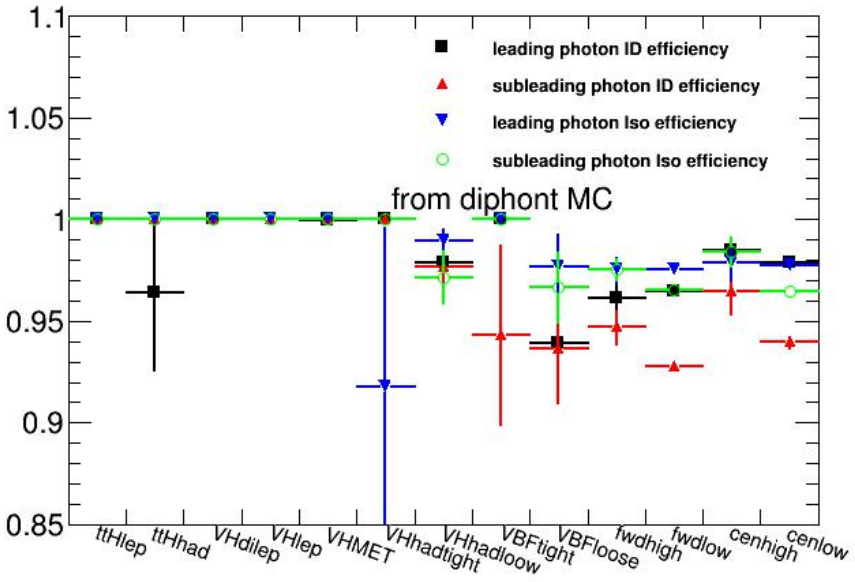
- 16 equations
- 4 known parameters
  - tight ID effciency
  - Iso effciency
  - from yy MC
- 13 free parameters
  - yield of yy,yj,jy,jj in LL region
  - 8 fake rate
  - isolation correlation factor in jj event
- constrain by data

$$
\begin{aligned}
N_{\mathrm{TITI}} = & W_{\gamma\gamma}^{\mathrm{L'L'}} \epsilon_{I1}\epsilon_{T1}\epsilon_{I2}\epsilon_{T2} \\
& + W_{\gamma\mathrm{j}}^{\mathrm{L'L'}} \epsilon_{I1}\epsilon_{T1} f_{I2} f_{T2} \\
& + W_{\mathrm{j}\gamma}^{\mathrm{L'L'}} f_{I1} f_{T1} \epsilon_{I2}\epsilon_{T2} \\
& + W_{\mathrm{jj}}^{\mathrm{L'L'}} f'_{I1} f'_{T1} f'_{I2} f'_{T2} \xi_{Ijj} ,
\end{aligned}
$$

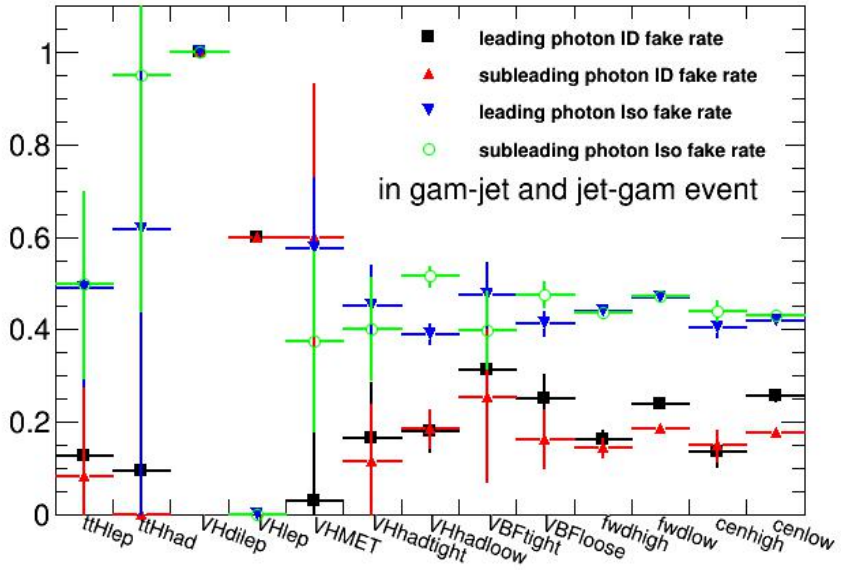
ID and Iso efficiency

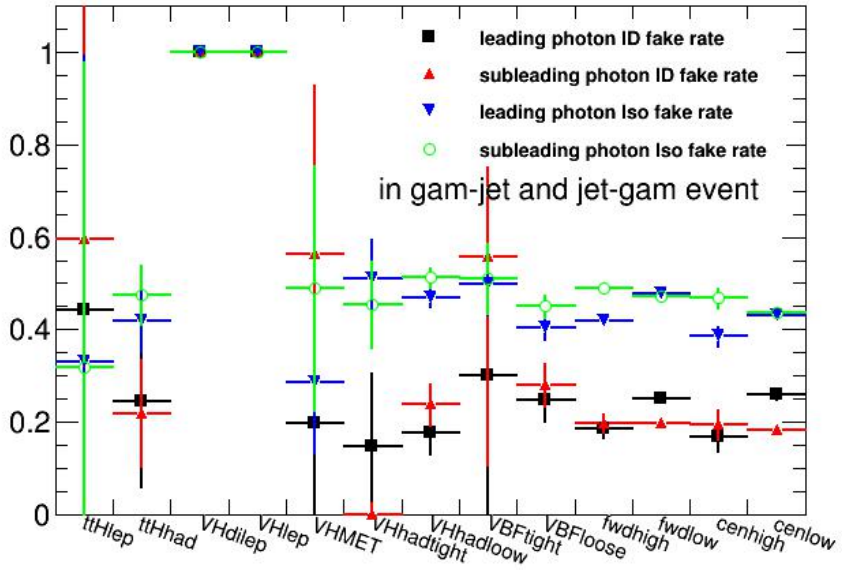
- from diphton MC
- very low statistic in ttH and VH non-hadronic category
  - ID and Iso efficiency close to 1 (few events fail ID or Iso)



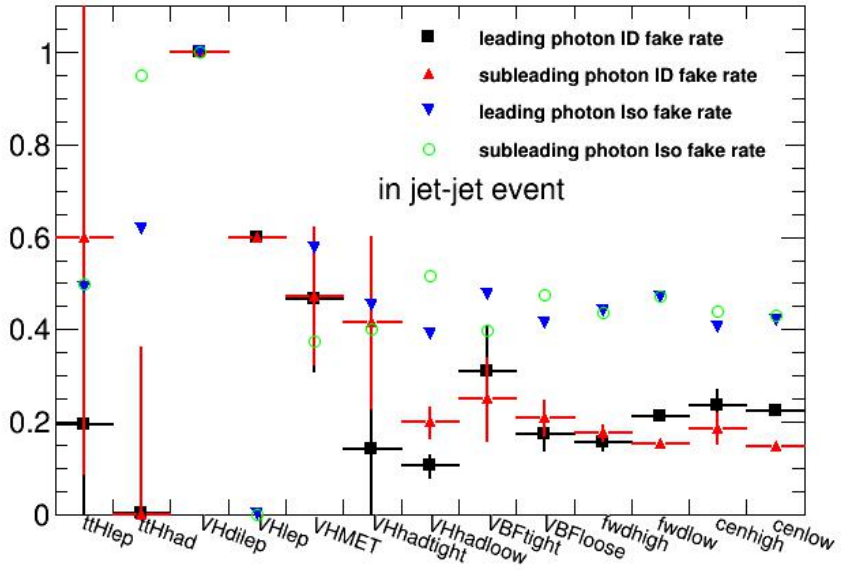


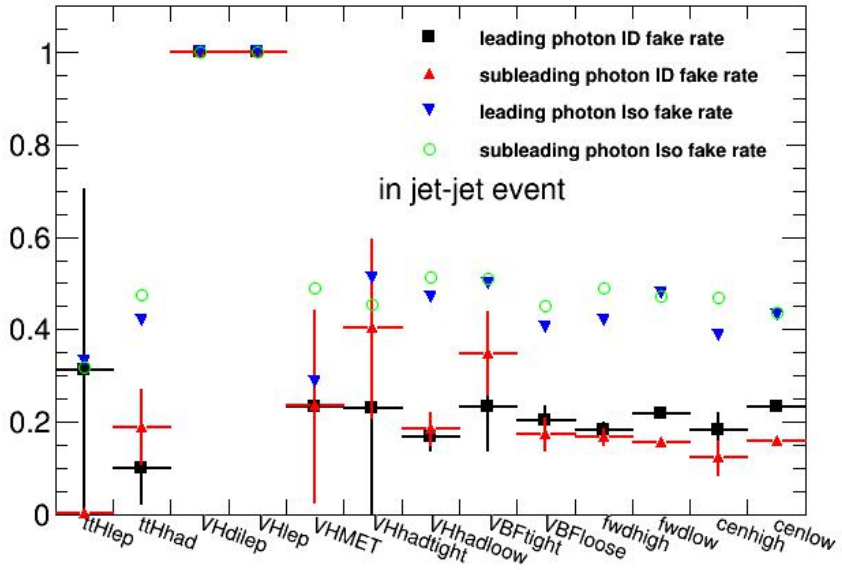
fake factor gam-jet and jet-gam





fake factor in jet-jet event





Purity

- left is 2015, right is 2016